

Unit 9

Day 1

Equations in Quadratic Form

1)

$$2x^4 + 5x^2 = 3$$

$$\text{let } y = x^2$$

$$2y^2 + 5y = 3$$

$$\frac{6}{-1} \quad 2y^2 + 5y - 3 = 0$$

$$(2y - 1)(y + 3) = 0$$

$$y = \frac{1}{2} \quad | \quad y = -3$$

$$x^2 = \frac{1}{2} \quad x^2 = 3$$

$$x = \pm \frac{1}{\sqrt{2}} = \pm \frac{\sqrt{2}}{2} \quad x = \pm \sqrt{3} = \pm i\sqrt{3}$$

$$\left\{ \pm \frac{\sqrt{2}}{2}, \pm i\sqrt{3} \right\}$$

$$2) \quad 4p^{-2} - 8p^{-1} = 5$$

$$4x^2 - 8x - 5 = 0$$

$$(2x - 5)(2x + 1) = 0$$

$$x = \frac{5}{2} \quad \left| \quad x = -\frac{1}{2} \right.$$

$$p^{-1} = \frac{5}{2} \quad p^{-1} = -\frac{1}{2}$$

$$p = \frac{2}{5} \quad p = -2$$

$$\left(-\frac{1}{2}\right)^{-1} = -\frac{1}{2}$$

$$\text{let } x = p^{-1}$$

$$\frac{-20}{-10 \quad 2}$$

Alternative method to Ex2:

$$4p^{-2} - 8p^{-1} = 5$$

$$p^2 \left(\frac{4}{p^2} - \frac{8}{p} = 5 \right)$$

$$4 - 8p = 5p^2$$

$$5p^2 + 8p - 4 = 0$$

$$(5p - 2)(p + 2) = 0$$

$$p = \frac{2}{5}$$

$$p = -2$$

$$3) \quad 2(p^2 + 1)^{-2} - 5(p^2 + 1)^{-1} - 3 = 0$$

$$2x^2 - 5x - 3 = 0$$

$$(2x + 1)(x - 3) = 0$$

$$x = -\frac{1}{2}$$

$$x = 3$$

$$(p^2 + 1)^{-1} = -\frac{1}{2}$$

$$p^2 + 1 = -2$$

$$p^2 = -3$$

$$p = \pm i\sqrt{3}$$

$$(p^2 + 1)^{-1} = 3$$

$$p^2 + 1 = \frac{1}{3}$$

$$p^2 = -\frac{2}{3}$$

$$p = \pm i\frac{\sqrt{2}}{\sqrt{3}} = \pm i\frac{\sqrt{6}}{3}$$

$$\text{let } x = (p^2 + 1)^{-1}$$

$$\left\{ \pm i\sqrt{3}, \pm i\frac{\sqrt{6}}{3} \right\}$$

Alternative method to Ex3:

$$2(p^2 + 1)^{-2} - 5(p^2 + 1)^{-1} - 3 = 0$$

$$\left[\frac{2}{(p^2 + 1)^2} - \frac{5}{(p^2 + 1)} - 3 = 0 \right] (p^2 + 1)^2$$

$$2 - 5(p^2 + 1) - 3(p^2 + 1)^2 = 0$$

$$2 - 5p^2 - 5 - 3(p^4 + 2p^2 + 1) = 0$$

$$-3 - 5p^2 - 3p^4 - 6p^2 - 3 = 0$$

$$-3p^4 - 11p^2 - 6 = 0$$

$$-3x^2 - 11x - 6 = 0$$

HOMEWORK: p. 136: 11-26 (all)

$$3x^2 + 11x + 6 = 0$$

$$(3x + 2)(x + 3) = 0$$

$$x = -\frac{2}{3} \quad x = -3$$

$$p^2 = -\frac{2}{3} \quad p^2 = -3$$

$$p = \pm i\frac{\sqrt{6}}{3} \quad p = \pm i\sqrt{3}$$

